of water between 1880 and 1908 is estimated at 20 per cent.

Other lakes to the north, north-east, and east of Aral show a similar rise during the last fifteen or twenty years. Lake Balkash has been rising since 1890; Lake Aschikul, in the Tschu depression, which was dry in 1888, was full in 1900, and there is a marked rise in many lakes in the Kirghiz Steppe, along the line of the West Siberian railway, and elsewhere.

The observations of rainfall taken at Barnaul on the upper Ob since 1838 are of great significance in this connection. The annual amount diminished from 1838 till 1868, then increased rapidly till 1895, and it has remained high, with small variations, since that year, the highest five year average (to end of 1906) being 1902–6.

The evidence goes then to show that the supposed continuous drying up of Central Asia has no existence in fact, but that variations occur which may or may not be periodic. If they are recurrent, the period must extend over at least sixty years, and its precise length cannot be determined before the end of the twentieth century, at the earliest.

Prof. Woeikow adds an interesting section on the history of the Sea of Aral, which has, naturally, important bearings on the question of secular variations of climate. A rise of the river Amu of only 4 metres above the level of 1901 would cause an overflow of part of its waters by the Usboï to the Caspian, one effect of which would be that the sea of Aral would become a fresh-water lake. Historical evidence (see Barthold, "Scientific Results of the Aral Expedition," 1902; and "Historical Geography of Iran," 1903: Berthold, by the way, is of opinion that the climate of Iran and Turan, so far as can be gathered from historical evidence, has remained practically unchanged for 2400 years) goes to show that from the thirteenth to the end of the sixteenth centuries this overflow actually occurred; and it would seem that this was a period of comparatively high rainfall in eastern Europe and western Asia.

A final section of Prof. Woeikow's paper deals with the thermal relations of water and air over the Sea of Aral. Space forbids a summary of the extremely interesting results obtained from Berg's observations, which appeal, perhaps, more to the specialist.

The definite conclusions set forth by so high an authority as Prof. Woeikow are of profound significance. The variations in the breadth of the grass belts between forest and hot desert, whether "savana" or "steppe," afford some of the most complex problems awaiting the geographer; the variation is probably greater the greater the total width of the belt, and the area in which the rainfall oscillates above or below a *minimum* point determining the possibility of human settlement of one kind or another is probably also greater. If it can be established that there is in effect no real evidence to show that in Central Asia a continuous diminution of rainfall is going on, but that a period of 30 or 40 years, or even of 300 years, of relatively small rainfall has passed its minimum, and that a similar period of greater fall has begun, then it follows that the historical problem of the depopulation of many of those regions, a problem of which the question of water supply can form only one element, becomes greatly modified. A thirty years' drought is no doubt sufficient to depopulate any district which has a low rainfall at the best of times, but increased rainfall does not necessarily mean immediate repopulation; and it does not follow that a region which has been deserted by its population at one time, through drought or other cause, has remained uninhabitable ever since. Again, it may be that large areas which for fifty years or more have been regarded as beyond hope will before long yield to modern methods of development and be added for a generation to come to the wheat producing, or at least the "ranching" regions of the world.

It is well that a belief which has often, in the absence of direct evidence, been used to bolster up the conclusion that rainfall was also diminishing a long way from Central Asia (the writer has heard it seriously used to support the contention that diminished yield of wells sunk in the chalk of south-eastern England was due to secular change of climate) should be definitely disposed of irrespective of its irrelevance. Assuming that no case of constant progressive diminution of rainfall in any part of the world has been established, and that none is now likely to be established, the problem seems to be to ascertain the nature and duration of these variations extending over long intervals of time. Are they periodic? if so, what is the length of period? What is the current phase at different parts of the earth's surface, and to what is the difference due? Central Asia has apparently just passed a *minimum* phase—has Central Africa just passed a maximum? Apparently fifty years of observation will be required to settle these questions.

H. N. D.

NOTES.

Sir Joseph Larmor, Prof. Felix Klein, and Prof. H. Poincaré have been elected honorary members of the Calcutta Mathematical Society.

The new rooms of the Royal Society of Edinburgh will be inaugurated on Monday next, November 8, when Sir William Turner, K.C.B., F.R.S., president of the society, will deliver an address, and a reception will be held.

Prof. K. Schwarzschild, director of the Göttingen Observatory, has been appointed to the directorship of the Royal Astrophysical Institute of Potsdam, rendered vacant by the death of Prof. Vogel. His position at Göttingen is to be filled by Dr. J. Hartmann, hitherto an assistant at the Potsdam institution.

The first fellowship established under the will of the late Dr. Sorby, F.R.S., of Sheffield, as reported in our issue of July 8 (vol. lxxxi., p. 42), has been awarded by the joint committee nominated by the Royal Society and the University of Sheffield to Dr. Jocelyn F. Thorpe, F.R.S., who will engage upon a research on the chemistry of the imino-compounds.

A Reuter message from New York states that Mr. J. D. Rockefeller has made a donation of 200,000*l*. in support of a commission of eminent medical men to investigate the hook-worm disease, which is prevalent in the rural districts of the southern States.

A meeting to inaugurate the new observatory and meteorological station of the Hampstead Scientific Society will be held on Saturday, November 6, at 3.30 p.m., at Heath Mount School, Heath Street, Hampstead. Mr. P. E. Vizard will take the chair, and the speakers will be Dr. F. Womack and Dr. H. R. Mill.

The eighty-fourth Christmas course of juvenile lectures, founded at the Royal Institution in 1826 by Michael Faraday, will be delivered this year by Mr. W. Duddell, F.R.S., his subject being "Modern Electricity." The course, which will be experimentally illustrated, will commence on Tuesday, December 28, and will be continued on December 30, 1909, January 1, 4, 6, and 8, 1910.

AT the opening meeting of the Institution of Electrical Engineers on November 11, a marble bust, by Hamo Thornycroft, of the late Dr. John Hopkinson, F.R.S., who was president in 1890 and in 1896, will be presented to the institution by Prof. Bertram Hopkinson on behalf of his mother, Mrs. John Hopkinson.

A DEPARTMENTAL committee has been appointed by the Home Secretary to inquire into the working of the existing special rules for the use of electricity in mines, and to consider whether any, and, if so, what, amendments are required. The members of the committee are:—Mr. R. A. S. Redmayne (chairman), Mr. C. H. Merz, and Mr. R. Nelson. Correspondence may be addressed to Mr. Nelson at the Home Office.

PRELIMINARY particulars have been sent to us of the United Provinces Agricultural and Industrial Exhibition which is to be held in Allahabad in December, 1910. An agricultural court will form one of the main features of the exhibition, and will be arranged on a scale more extensive than anything previously attempted in India. The Agricultural Department of the United Provinces has assumed responsibility for the agricultural court, and inquiries regarding it should be directed to the Deputy Director of Agriculture, Cawnpore. It is hoped that this court will contain an economic collection of agricultural exhibits of interest, not only to the producer, but also to the consumer and to the manufacturer of finished articles from raw products.

SCIENCE in the daily Press usually consists of snippets of sensational information which if true is not new, and if new is not true. Any attempt to represent the true position of scientific work and thought, the progress of research, and the best aims of higher education for the enlightenment of the general public is worthy of encouragement. We are glad to see, therefore, that the *Standard* has decided to pursue the policy of presenting its readers with systematic surveys of scientific research and progress by means of special articles, reports of the proceedings of learned societies, and in other ways. An article upon the place of research in education was contributed by Principal Miers, F.R.S., to Monday's issue (November 1), and Sir Joseph Thomson will discuss the research degree and its working at Cambridge in an article which will appear on the first Monday in December. Particular attention is to be given to research facilities and results, and the intention of the scheme is to make the public realise what the scientific spirit signifies and what is being done by it for the advancement of natural knowledge. Such efforts to direct public attention to the aims, methods, and conclusions of science should lead to increased recognition of the national value of research and higher education. We shall watch the experiment with interest, and in the hope that it will meet with unqualified success.

OCTOBER was a wet month in nearly all parts of the British Isles, but the excess of rain was due to the remarkable falls which occurred during the closing week, when the south and east of England, especially, came under the influence of a cyclonic disturbance which, for a time, remained fairly stationary over the entrance of the English Channel. The weather report for the week ending October 30, just published by the Meteorological Office, shows that at Broadstairs the total for the period was 6·03 inches, and in three days the rain yielded 5·79 inches; at Margate the total for the week was 5·68 inches, and at Brighton 5·15 inches. On one day in the middle of the week the rainfall at Brighton measured 3·32 inches, at Broadstairs 2·93 inches, at Margate 2·73 inches, and at Shoeburyness 2·50 inches. Some remarkable falls have undoubtedly occurred, but it is rather too early for an exact statement of facts. The aggregate rainfall for the month is reported as 9·82 inches at Shanklin, 9·40 inches at Southampton, and more than 8 inches at Brighton and Bournemouth. At Valencia the total rainfall for October is 8·06 inches, and rain fell every day with three exceptions; at Jersey the total was 7·14 inches. At Greenwich the aggregate measurement for the month is 4·07 inches, whilst the average for October during the last half-century is 2·78 inches, and rain fell on twenty-two days. In 1880 the October rainfall at Greenwich was double the measurement for last month. At several places in Scotland and in the north of England the rainfall for October was slightly less than the average. The month was unusually mild, and the duration of bright sunshine varied considerably in different parts of the country.

IN his presidential address to the Institution of Civil Engineers on Tuesday, November 2, Mr. J. C. Inglis did not deal with any particular engineering subject, but rather commented upon the recent activities of the institution, the professional status of the engineer, and the position he occupies in relation to certain economic questions of the day. Referring to the new by-laws and regulations drawn up with the object of securing a higher and more efficient standard of training than has hitherto been required, Mr. Inglis pointed out that there still appears to linger a certain popular confusion of ideas regarding knowledge which can be tested by question and answer in ordinary examination papers, and ability to apply such knowledge intelligently to the practical problems of every-day professional life. The Institution of Civil Engineers, differing perhaps in degree, though not, it is thought, in principle, from the views sometimes entertained by other bodies on this subject, has persevered throughout in the belief that for success in the application of the great powers of nature to the use and convenience of man, there can be, as a rule, no efficient substitute for regular training under those who are practising that art; albeit, the foundation of intelligent work in this direction lies in the possession of sound education and appropriate scientific knowledge. The successful engineer of the future must possess in an increasing degree a thorough knowledge of the principles of design, of the materials to be used, and their behaviour when in use (keeping in view the facility and cost of repairs), and of the actual working conditions affecting the life of the structure or plant or machine designed. The engineer should not only know how to design his works, but be familiar with the conditions under which they are to be used. The practical engineer of the early part of the nineteenth century built up his theory from his personal experience, and applied his self-taught theories according to his judgment. The practical engineer of the twentieth century is he who, knowing the theoretical principles of his profession, employs as data the facts gathered from his experience, and whose generalisations from such experience merely consolidate his knowledge of principles.

Naturen for October contains an appreciative memoir by Mr. P. R. Sollied, accompanied by a portrait, of Emil Christian Hansen (1842–1909), with an account of his bacteriological researches.

WE have received a specimen copy of the first part of "Coleopterum Catalogus," edited by Mr. S. Schenkling, and published by W. Junk, of Berlin, this part being the work of Mr. R. Gestro, and dealing with the family Rhysodidæ. Full synonymy of the families, genera, and species is given, but there are no diagnoses. An index of the species of this family is given at the end of the part.

To the October number of the *Zoologist* Mr. A. H. Patterson communicates the first part of an interesting account of the fisheries and fish of east Suffolk, with special reference to the takes of herring and mackerel at Lowestoft. In regard to the apparently capricious movements of the shoals of mackerel, the author expresses the opinion that these are entirely due to tidal and other influences affecting the natural economy of the species.

IN their report for the year ending June 30, the members of the committee of the Manchester Museum put on record their regret at the resignation of Dr. W. E. Hoyle, who held the office of keeper (a title latterly changed to director) of the establishment for the long period of twenty years. Dr. Hoyle resigned on March 25, when he was appointed director of the National Museum at Cardiff. Among important additions to the museum during the year under review, reference may be made to a collection of fossil fishes made by the late Mr. John Ward.

ACCORDING to the *Museum News*, the authorities of the Children's Museum at Bedford Park, Brooklyn, have been devoting their attention during the past summer to exhibits illustrative of the Hudson-Fulton celebration. A large series of the animals inhabiting the country at the time of Hudson's visit has been placed on exhibition, with special notes to those which are now on the point of disappearing or which have been already exterminated. Such species of trees growing in the museum gardens as were native to the country in Hudson's time have also been marked with special labels.

IT is satisfactory to learn from the September number of the *Victorian Naturalist* that the colony of sea-lions on "Seal Rocks," in Bass Strait, continues to flourish under Government protection. In November, 1908, a party of naturalists left Melbourne for a cruise in Bass Strait, and one of their number gives the following account of their visit to the sea-lions:—"As we approached this haunt of the seals, hundreds of the animals could be seen in the water, and from the rocks came, borne on the wind, the sound of their voices. The rookery presented a 'moving spectacle,' as we surveyed it through binoculars from the steamer's deck. Huge brown forms were clambering among the pools and darting in and out of the surf, while sleek cubs lay basking in the sunlight beside their anxious mothers." In the same issue attention is directed to the serious destruction now being inflicted on the native bird-fauna of the country by the progeny of introduced European foxes.

IN vol. cxviii., part i., of the *Sitzungsberichte der k. Academie der Wissenschaften*, Prof. O. Abel gives a restoration of the skeleton of *Eurhinodelphis cocheteuxi*, of the Belgian Upper Miocene, in which the prolongation of the toothless rostrum far in advance of the lower jaw is well shown. The length of the figured skeleton, which is probably that of a male, is nearly 16 feet, but the majority of specimens are smaller. From the strong development of the caudal vertebræ, indicative of powerful tail-muscles, the author infers that these cetaceans were swift swimmers, while the free cervical vertebræ permitted, as in the fresh-water Iniidæ and Platanistidæ, of considerable movements of the head. These circumstances, taken in connection with the long edentulous rostrum, projecting far in advance of the lower jaw, and the weak state of the dentition generally, suggest that these long-snouted dolphins swam on the surface of the sea, where they captured their food—probably fishes—in much the same manner as does the skimmer (Rhynchops) among birds. Dr. Abel also describes the skull of *Saurodelphis argentinus* from the Argentine Pliocene, and shows that the genus was nearly allied to the existing Amazonian Inia.

THE brain of the late Prof. D. J. Mendeléeff, the chemist, has been investigated and described by Profs. W. von Bechterew and R. Weinberg. The results of their investigation, with eight finely finished plates, form the first of a series of monographs dealing with the anatomy and development of the body, which is to be edited by Prof. Wilhelm Roux, of Halle, and published by Mr. W. Engelmann, of Leipzig. The size of the great chemist's brain was above the average, but not remarkably so; its weight was 1571 grams. The convolutions are simple in their arrangement; indeed, no one, from a mere examination of the organ, could have formed any opinion—at least in our present state of knowledge—as to the very special qualities manifested by it in life. Only two features were in any degree peculiar—a highly convoluted part of the left parietal lobe and a comparatively small and simple temporal lobe. Profs. Bechterew and Weinberg have made a very welcome addition to the limited number of descriptions of the genius-brain, and if at present the results of their labour appear to be negative, the day may soon come that will provide a key to the facts which they have been content merely to tabulate and to describe accurately.

PROF. E. GAUPP, of Freiburg, has devoted the fourth part of the "Sammlung anatomischer und physiologischer Vorträge und Aufsätze" to the consideration of the asymmetry of the human body (Jena: Gustav Fischer). From a consideration of the literature dealing with this matter, he has come to the conclusion that asymmetry in the right and left halves of the body is normal, and is to be regarded, not as a defect, which was the opinion formulated by Bichat a century ago, but as an advance and sign of specialisation. The asymmetry of the skull, face, jaws, spine, chest, pelvis, and limbs is not present at birth; it appears as the individual becomes adapted to his surroundings. The asymmetry is not a question altogether of right- or left-handedness or right- or left-brainedness; in Prof. Gaupp's opinion the tendency to a right- and left-sided specialisation is inborn in the individual. The asymmetry is simply exaggerated by the reaction of use and disuse. Classical sculptors represented in their work a degree of asymmetry of the face equal to that seen in modern races. The greater the degree of asymmetry the higher the point of evolution. Prof. Elliot Smith found that the hemispheres of the negro brain, and especially those of the anthropoids, showed a smaller degree of asymmetry than those of European races.

AN article by Mr. B. L. Issatchenko, continuing two earlier communications on the conditions for chlorophyll formation, is published in the *Bulletin du Jardin Impérial Botanique*, St. Petersburg (vol. ix., part v.). The author states that a low temperature (−8° C.) does not prevent the formation of chlorophyll, and that it is formed in plants as quickly at a low temperature as a high one, the formation of the pigment depending exclusively on the strength and duration of the light. According to other results obtained, the formation of chlorophyll continues in the presence of the vapour of formaldehyde or chloroform.

DR. F. KRASSER has prepared for publication a series of diagnoses, left by the palæontologist Stur, of some fossil plants found in Triassic beds at Lunz, in Lower Austria, that are assigned to the filicinean family Marattiaceæ. Seven genera and seventeen species are confirmed by Dr. Krasser, of which one genus, Speirocarpus, and ten species are new to science. Five of the genera go back to the Palæozoic, but Speirocarpus and Bernoullia have only been found in Mesozoic strata. The article appears in the *Sitzungsberichte der kaiserlichen Akademie der Wissenschaften*, Vienna (vol. cxviii., part i.).

FURTHER information regarding the curious herbaceous Ecanda rubber plant, *Raphionacme utilis*, is published in the *Kew Bulletin* (No. 8). The plant grows abundantly on a plateau in the district of Bihé, Portuguese West Africa; it produces a short leafy shoot and a good-sized tuber, from which the rubber is obtained. The tubers vary in weight up to 5 lb., and occasionally exceed this measure. It seems probable that there may be more than one species. The plants can be propagated from seed, but take several years to reach a marketable size. In the same number of the Bulletin there appears a short note, by Mr. J. M. Hillier, with reference to a new rubber plant, *Asclepias stellifera*. The identification refers to samples of root rubber forwarded by Mr. J. Burtt Davy from the Transvaal, one of which was reported to be of good quality.

A FACT of peculiar interest in connection with plant distribution is presented by Dr. Engler in the discovery, announced in his *Botanische Jahrbücher* (vol. xliii., part iv.), of an African plant referred to the family Triuridaceæ. The plants of this family are saprophytes of such a reduced nature that there is some doubt whether they are correctly classed with monocotyledons. Several species, under two genera, have been discovered in tropical America and tropical Asia; also a new species from the Seychelles islands was described by Mr. Botting Hemsley in 1907. The latest species was collected in West Africa, in the Cameroons, so that the genus Sciaphila is now recorded from three continents. It is quite unlikely that the seeds of a plant which is a saprophytic inhabitant of virgin forest should be transported by water, and the problem of its existence in these distant isolated localities is exceedingly puzzling. An anatomical examination of the stem showed a reduced structure not inconsistent with a monocotyledonous position.

UNDER the subtitle "Les Districts littoraux et alluviaux," the Jardin botanique de l'État has issued, with the authority of the Belgian Ministère de l'Intérieur et de l'Agriculture, the first portion of a work on "Les Aspects de la Végétation en Belgique," by Profs. C. Bommer and J. Massart. The studies of these two authors in this field, the results of which have appeared in the pages of the *Bulletin de la Société royale de Botanique de Belgique*, are already well and favourably known. In a brief *résumé* Prof. Th. Durand, director of the Brussels Botanic Garden, explains the object the authors have in view, and informs us that the work, in its complete form, will include some 400 plates distributed in five parts, as follows:—i., Districts littoraux et alluviaux, by Prof. Massart; ii., Districts flandrien et campinien, by the same author; iii., Districts argilo-sablonneux et crétacé, by Prof. Bommer; iv., Districts calcaire et jurassique, by Prof. Massart; and v., District ardennais, by Prof. Bommer. The work will include in its scope the illustration both of the cultivated and of the uncultivated portions of Belgian territory, and will endeavour to give a complete picture of the vegetation of the whole country. The method adopted by the authors in preparing their illustrations has involved their securing photographs on plates measuring 30 cm. by 40 cm. With the object of rendering available for independent use the more important of these plates, it has been resolved to issue a reduced edition containing about one-fourth of the plates in the complete work. The copy of this reduced edition of the first volume, now under notice, contains twenty-four plates as against eighty-six plates in the complete edition of the same volume. These plates are excellent reproductions from photographs of great beauty. They largely explain themselves, and are highly instructive. The accompanying letterpress is reduced to a brief amplification, in three pages, of the systematic summary of the plates, whereof 1 and 2 illustrate the District des Estacades et Briselames; 3–9, the District des Dunes littorales; 10–13, the District des Alluvions marines; 14 and 15, the District des Alluvions fluviales; 16–22, the District des Polders argileux; while 23 and 24 illustrate the District des Polders sablonneux et des Dunes internes.

THE thirty-first and thirty-second reports of the Connecticut Agricultural Station for the years 1907–8 form a volume running into nearly a thousand pages. A considerable amount of space is devoted to the reports from the analytical laboratories, where large numbers of foodstuffs intended for human consumption are investigated in addition to the ordinary agricultural materials. In accordance with the American system, results of the analysis are published, together with the trade name of the article, the manufacturer, the dealer, the price, and the guaranteed composition, so that one can see at a glance which articles are above and which below their guarantees. Dr. Osborn, head of the laboratory for the study of proteids, reports that he has isolated a new substance from one of the wheat proteins, a di-peptide of proline and phenyl-alanine. This substance is important, not only in connection with the structure of wheat protein, but in connection with the chemistry of proteins in general. Quantitative determinations have also been made of the amounts of decomposition products of various vegetable proteins. The entomological department has spent much effort in subduing the gypsy moth at the only place in the State where it was found. The infected area was isolated by destroying the shrubs and bushes on all sides of it as far as possible; within the area all larvæ, pupæ, and egg-masses discovered were destroyed; 14,000 trees were banded and inspected daily. A new orchard pest, the peach saw-fly, which threatened great injury, was completely controlled by spraying with lead arsenate. In the agricultural department a number of experiments are recorded on the hybridisation of potatoes. The botanist records studies of the "calico" disease of potatoes, and chlorosis in other plants, the downy mildew of Connecticut, the root rot of tobacco caused by the fungus *Thielavia basicola*, and of certain heterœcious rusts of Connecticut having a peridermium for their œcial stage. The forester has carried out experiments on the economical planting of white pine, on different methods of seeding and planting forest trees, on the fertilisation of young trees by growing cow peas, on the progress of the white pine disease, and on methods of treating the pine weevil. The increased interest in forest planting in Connecticut is shown by the fact that about 100,000 forest trees were planted in 1906, 350,000 in 1907, and 600,000 in 1908. A forest survey is in hand, and a fire service has been organised.

PROF. L. DUPARC, assisted by Dr. Francis Pearce and Madame Tikanowitch, his colleagues in the University of Geneva, has issued the third and concluding part of his "Recherches géologiques et pétrographiques sur l'Oural du Nord; le Bassin de la haute Wichéra" (*Mémoires de la Société phys. et d'Hist. nat. de Genève*, vol. xxxvi., fascicule i., July, 1909, price 20 francs). The results of three expeditions, from 1904 onwards, are here reviewed, and the igneous and metamorphic rocks are described in considerable detail. The region lies on the west side of the Urals and north of Solikamsk, where numerous streams unite, flowing from a broad basin, to form the Vishera River, which in turn flows into the Kama, and thus into the Volga system. The plateaus, covered with stones and showing few good rock-exposures, represent a mass uplifted during the Hercynian earth-movements, and subjected to prolonged denudation. Interesting terrace-structures, preserved only among the hard quartzitic ranges, point to ancient epochs of erosion under conditions different from those of the present day. Successive terraces rising above one another, and apparently independent of tectonic structure, offer a problem which Prof. Duparc is compelled to leave at present unexplained. They certainly suggest, in the numerous sketches given, relics of abnormally large terraces of marine erosion rather than uplifted peneplains. Among the petrographic descriptions we note that a highly pleochroic amphibole, associated with magnetite, occurs in one of the ore-materials; the authors believe this to be a new species, and have elsewhere given it the name of "Tschernichéwite." Its characters are as yet incompletely determined; if we may judge from those here given, its weak birefringence seems to ally it to riebeckite, while its axial plane is in an unusual position for an amphibole, and its pleochroism is near that of glaucophane. The iron mines of the district are carefully described, and the memoir is well illustrated by photographic views and effective drawings of broad landscapes.

In the *Reliquary* for October Mr. T. Sheppard, curator of the Municipal Museum, Hull, records the discovery at Malton, in Yorkshire, of two interesting bronze statuettes, one, the more primitive of the two, representing Hercules bearing the skin of the Nemean lion, the other Venus. They probably belong to the third century A.D., and may have been lost or buried at the time the Roman legionaries were withdrawn from Britain.

The Meteorological Chart of the North Atlantic Ocean for November, issued by the Meteorological Committee, contains an account of a West India hurricane experienced by the ship *Barranca* (Captain W. Long) in August last. At noon on August 15 she was in 24° 42′ N., 57° 1′ W., with a falling barometer and strong easterly breeze. At 4 p.m. the barometer failed to respond to the diurnal range, which showed that a storm was not far distant. On the morning of August 16 the ship met the full force of the hurricane, and at 2h. p.m. the sea was "like a boiling cauldron." Next day the east wind veered to south-west, and the ship's position at noon was 22° 43′ N., 61° 44′ W., having apparently drifted some 100 miles to the north, out of her south-west course, in two days. Owing to careful navigation, in accordance with the rules laid down in the "Barometer Manual" issued by the Meteorological Office, the only damage sustained by the ship was a severe straining.

In the *Rendiconti della R. Accademia dei Lincei* (vol. xviii., 1909) Dr. F. Eredia publishes an interesting preliminary note on the frequency of wind-direction in central Italy. The discussion shows clearly the different effects of the two slopes which divide the country from the Adriatic and Tyrrhenian Seas. Winds from N.–E. prevail along the Adriatic slope in summer and along the Tyrrhenian slope in winter, and winds from S.W.–N.W. predominate in winter along the Adriatic slope and in summer along the Tyrrhenian slope; thus, while one direction has its maximum of frequency on one slope, it has its minimum along the other. The author endeavours to explain these facts and to compare them with the theoretical laws of the circulation of the atmosphere.

A valuable series of articles on life in the various colonies and other countries in which many of our young electrical engineers obtain posts has appeared in the *Electrical Review* during the last two months. Although intended, in the first instance, for electrical engineers, they will prove of great value to all who have thoughts of taking up appointments abroad, as they are in every case by men with practical experience of the countries about which they write. Each article deals with the climate of the country, the cost of living, the salaries, and the ultimate prospects of those taking up posts open to Europeans.

The vacuum vessel introduced by Dewar has proved of such value as a means of improving the thermal insulation of bodies that it is no surprise to find it introduced into calorimetry. At the suggestion of Prof. Nernst, of the University of Berlin, Dr. H. Schottky has carried out a series of measurements with a modified form of Favre and Silbermann calorimeter, in which the mercury was replaced by pentane and the bulb of the calorimeter surrounded by a vacuum vessel. The instrument looks like a Bunsen ice calorimeter using pentane instead of ice, and having a vacuum vessel around its bulb. It has proved a great improvement on its predecessors, and is considered by Dr. Schottky to be extremely accurate. A full description appeared in the *Physikalische Zeitschrift* for September 15.

We have received separate copies of a number of papers which have been written by the staff of the Physikalisch-technische Reichsanstalt, and have appeared in the *Annalen der Physik* and other periodicals during the past few months. Two of them deal with optical subjects, and are of special interest. In the first place, it has been found by Drs. E. Gehrcke and G. Leithauser that it is possible to convert a celluloid copy of a diffraction grating, such as have been made by Thorpe, of Manchester, for some time, into a reflecting grating by dusting it with kathode particles in a vacuum. The process gives gratings which are almost as good as the original. Further, Dr. L. Janicke has been investigating the properties of the spectral lines of the metallic elements by the high dispersion obtainable with the Lummer-Gehrcke plate spectroscope, and gives the wave-lengths of the sharp lines of the spectra of fourteen elements, which were used as the anodes of arcs burning *in vacuo*.

At a recent meeting of the Association of Municipal and County Engineers a paper was read on the "G.B." tramway system and its results in Lincoln by Mr. S. Clegg, the city electrical engineer. The author stated that during the first twelve months a total of seventy-one live studs was recorded, these being mostly owing to defects in details in the original construction. The old type of cable had been completely replaced in 1908, and the average at present is about three live studs per month. Mr. Clegg considers that there is less danger to the public from shock and personal injury with the "G.B." system than with the overhead system. Studs which had become alive at Lincoln had always been located as soon as they occurred without danger to anyone.

Commenting on the aviation meetings at Doncaster and Blackpool, *Engineering* for October 22 directs attention to the advantages of the monoplane from the point of view of transport from place to place. The frame consists simply of the backbone carrying the engine, driving-seat, and controlling gear, together with the wheels on which the machine runs when on the ground. This can be sent complete in one piece, the main wings and the horizontal and vertical rudders being detached for the purpose. The wings are attached very easily by means of sockets on the backbone and by wire ties. In the case of one competitor, whose main wings had not arrived until late in the morning, these were all fixed up in about an hour. Probably with more experience it will be possible to design a monoplane which can be taken to pieces or erected complete in an hour or two. The biplane, having more numerous tie-rods, appears to require much larger packing cases or more time for its erection, according to the extent to which it is taken to pieces. In the air the biplanes certainly appear to be more steady than the monoplanes, the latter occasionally flying in a series of dips, especially when near the ground. When high up, however, the monoplane appeared very steady.

While remarking on the enormous advance which has been made in aviation, *Engineering* points out that the motors have very far from the trustworthiness required for practical work, and each machine had several mechanics in attendance on it. The engines at present in use require a large amount of attention. This is a matter which should be capable of amendment. The other limitations which require attention are the incapacity for flying in bad weather and for alighting on rough ground. To be of any practical use, aëroplanes should be capable of alighting and starting from an ordinary grass or stubble field, and there does not seem the least difficulty in arranging for this; in fact, the combination of runners and wheels on the Farman machine would probably be satisfactory. Flying in a wind may possibly be largely a matter of practice and confidence, and it is quite possible that, with very little alteration in the machines, men will learn to fly in any reasonable weather.

Erratum. In the article upon the magnetic results of the *Carnegie* (October 28, p. 532, col. 2, line 3 from bottom) Dr. Bauer should have written ½° instead of ½′, which was the value given in the typewritten communication received from him and printed in Nature.

OUR ASTRONOMICAL COLUMN.

Changes on Mars.—Another large prominence on the terminator of Mars is announced by M. Jarry-Desloges in No. 4364 of the *Astronomische Nachrichten* (p. 335). This object was seen on the night of October 14–15 in the region of Phaëthontis, which itself was very white; this whiteness of Phaëthontis, and similar regions near the limb, was remarked by the Rev. T. E. R. Phillips in his observations of 1903.

A drawing of the planet, as it was seen by M. Antoniadi with an 83-cm. reflector on September 20, is published as a frontispiece to No. 10, vol. iii., of the *Rivista di Astronomia* (Turin).

Halley's Comet.—In No. 4364 of the *Astronomische Nachrichten* (p. 333, October 20) Prof. Wolf publishes the position of Halley's comet as determined from a plate taken on October 10, and states that, with a power of 140 used on the reflector, he is able to see the comet as a small nebulous patch; but it is on the limit of visibility with this instrument, its magnitude being given as 14·5.

In the same journal (p. 335) Mr. Knox Shaw gives positions determined from photographs taken at the Helwan Observatory on September 13, 15, and 16 respectively.

An interesting popular article, dealing with the history and nature of the comet, appears in part cxliii. of *Chambers's Journal* (p. 710, November 1) from the pen of Dr. Alex. W. Roberts.

Sun-spot Spectra.—A summary of the results so far obtained from the study of the photographs of sun-spot spectra, taken at the Mount Wilson Observatory, is published by Prof. Adams in No. 2, vol. xxx., of the *Astrophysical Journal* (pp. 86–126, September).

The paper is too comprehensive for adequate summary in these columns, where many of the details have already appeared, but the various tables given will prove interesting and instructive to all workers in this branch of solar physics.

Prof. Adams believes that the intensification of various solar lines in the spot spectrum is due to the lowering of temperature, and not, in general, to a variation of pressure. Investigations at Mount Wilson, where a shift of 0·003 or 0·004 Å. could be detected, indicate that the excess of pressure in spots, over that on the surface of the sun, can hardly be so great as one atmosphere. A study of the enhanced lines, based mainly on the tables published by Lockyer, shows that of 144 such lines 130 are distinctly weakened, while fourteen show no change, in passing from the Fraunhoferic, to the spot, spectrum.

The lines of each element are studied *seriatim*, and of the lines of iron given by Rowland, 784, or 71 per cent., are affected in the spot spectrum; of the 558 lines due to iron alone, 300 are strengthened and 258 weakened in passing from the solar to the spot spectrum. The behaviour of the iron lines is best explained by the decrease of temperature in the spot.

The greater part of the unknown fluting, and band, lines in the spot spectrum may be accounted for by the presence of the titanium oxide, "magnesium hydride," and "calcium hydride" spectra, whilst the lines that are widened without marked increase of intensity are sufficiently explained by the existence of a magnetic field in sun-spots.

Designations of newly discovered Variable Stars.—The committee for the A.G. Catalogue of Variable Stars publishes the permanent names of sixty-two recently discovered variables in No. 4364 of the *Astronomische Nachrichten.* The provisional name, permanent designation, position, and magnitude range are tabulated for each object, and a series of notes gives particulars of discovery and subsequent observations.

The Motions of some Stars in Messier 92 (Hercules).—Prof. Barnard discusses the proper motions of certain stars in the cluster M. 92 in a paper appearing in No. 4363 of the *Astronomische Nachrichten.*

Micrometer observations of this cluster were made by Schultz, at Upsala, about 1873, and results were published for thirty-seven stars. These results, when compared with those obtained from a photograph taken in 1898, led Dr. Bohlin to the conclusion that some of the stars exhibited large proper motions during the twenty-five years' interval, but Prof. Barnard suggested that Schultz's observations of faint objects with a 9-inch telescope were probably not sufficiently exact to permit of this deduction; measurements of two photographs, taken with an interval of eight years between them, confirm the suggestion.

There are two stars, however, which show decided motions during the eight-year interval, one being No. 11 and the other a fainter star temporarily designated *a*. The former has an annual motion of 0·085″ in position angle 220° (8·5″ per century), and the second an annual motion of 0·065″ in position angle 181·4° (6·5″ per century). Prof. Barnard concludes that another fifty years should show motion in many of the stars of this cluster, whilst within a few hundred years it will be possible to investigate the laws which control the motions of this and similar great and crowded masses of stars. A carefully oriented reproduction of a photograph of M. 92, taken with the 40-inch telescope, accompanies the paper, and will facilitate further work on this interesting cluster.